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ECONOMIC BASE REPORT

# Hamakua Area Agricultural Water Study

UNITED STATES DEPARTMENT OF AGRICULTURE  
Economics, Statistics, and Cooperative Service  
Forest Service  
Soil Conservation Service

STATE OF HAWAII  
Department of Land and Natural Resources  
Mauna Kea Soil and Water Conservation District

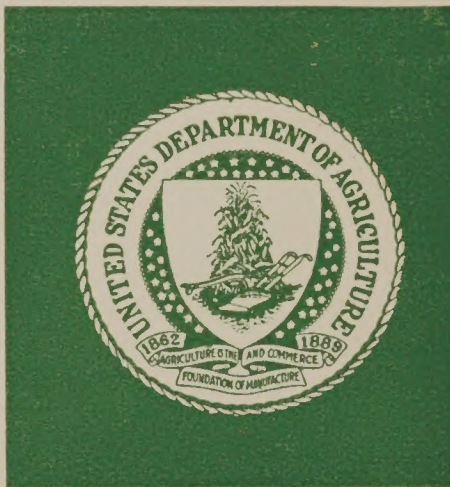




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Prepared by:

United States Department of Agriculture  
Soil Conservation Service  
Honolulu, Hawaii

August 1980





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## HISTORICAL BACKGROUND

Much of the State of Hawaii's history and culture had its beginning on the island of Hawaii. The study area has evidence of Hawaiian settlers that date back to the 13th century. Hawaiian legend tells of Liloa, the first ruler of the island, who lived in the Waipio Valley where some of the most advanced and self-sufficient agricultural and settlement complexes on the island were located. Important evidence of early activity is still visible on the surface. Heiaus, burial sites, and shrines can be found scattered throughout the study area.

Perhaps the most important contribution of the early settlers in the study area was in the field of agriculture. In the Hamakua coastal areas there is evidence of ancient taro cultivation. Sugarcane was found growing in the islands when Captain James Cook arrived in Hawaii in 1778. Sugarcane cultivation expanded slowly at first, but rapidly after the 1876 Reciprocity Treaty. This treaty made possible the duty free entry of sugar to the United States. By the end of the 19th century, the cultivation and processing of sugarcane was the major industry of Hawaii. The Lower Hamakua Ditch, built in 1910, provided the first large-scale irrigation system on the island.

The sugar industry was responsible for bringing Oriental and European workers to Hawaii. The first Chinese immigrants arrived to work on the sugar plantations in 1852, followed by the Japanese, Portugese, German, and Filipino immigrants. As each successive group arrived, their cultures became part of the island's traditions. The Christian missionaries had already established themselves and the general population had become localized in plantation communities.

## GENERAL DESCRIPTION

Compared to the fast-paced modern city of Honolulu, progress has left the study area relatively unchanged, as evidenced by the profile of the area. Sugarcane still dominates most of the lower coastal areas up to about the 2,600-foot elevation. Residential and commercial activities within the area are still centered around the plantation towns. Within the area there are scattered macadamia nut orchards and truck crop farms and at higher elevations the land is used for grazing or is forested.

Numerous factors have influenced the socio-economic development of the study area. Population, employment, and income characteristics are the most important indicators of the well-being of the study area as it exists. Other social and economic factors discussed are education, ethnic groups, and labor force characteristics.



Published materials were used extensively as sources of information for this study. Information pertaining specifically to the study area was sometimes not available because data is not usually collected for areas smaller than districts and the study area boundaries do not follow established district boundaries. The study area encompasses parts of three districts in the County of Hawaii; the Hamakua, North Hilo, and South Kohala Districts. These three districts are considered to be representative of the study area and were used as the unit of economic study.

### Population and Population Characteristics

The population of the study area increased from 8,800 in 1970, to an estimated 10,800 in 1978. This was an increase of approximately 23 percent in 8 years (Table 1).

The 1978 population estimate represented approximately 13 percent of the County of Hawaii's, and about 1 percent of the State of Hawaii's total population.

Since the 1900's, the population of the state has increased steadily over the decades (Table 1). The population of the County of Hawaii paralleled the state's trend of growth until the 1930's when the population of the county started to decline. The main contributing factor for the out-migration of the population was the mechanization of the sugar industry and the subsequent decrease in job opportunities. In the mid-1960's, the county's population began to increase as tourism emerged as a major industry. Since 1970, the County of Hawaii's population has been growing at an annual rate of about 3 percent, even faster than the County of Honolulu's 1.9 percent annual growth, and the state's 2.1 percent annual growth.

The study area is a major sugar producing area with much of its employment dependent on agriculture. Thus, the mechanization of the sugar industry and the resulting loss of employment caused the population decline in the study area to be even more severe than that of the county as a whole (Table 1). The population shifted from rural agricultural areas to more urbanized areas such as Hilo. The population of the study area has stabilized in recent years and is expected to increase to 12,600 in 1980 and 21,900 in 2000. Most of the population growth is expected in the South Kohala District, due to its growing tourist industry.

The population density in the study area is relatively low as compared to other areas of the state (Table 2). In 1970, population per square mile for the study area and the County of Hawaii was 7.5 and 15.7, respectively, and 1,055.7 and 119.6 for the County of Honolulu and the state.

Table 1

Population\*

Year		Study Area	County of Hawaii	State of Hawaii
1900		11,100	46,800	154,000
1910		14,000	55,400	191,900
1920		16,100	64,900	255,900
1930		15,100	73,300	368,300
1940		14,100	73,300	422,800
1950		11,100	68,400	499,800
1960		9,300	61,300	632,800
1970		8,800	63,500	769,900
1975		10,100	75,300	868,400
1976		10,300	77,800	883,500
1977		10,500	79,200	891,400
1978		10,800	80,900	896,600
<u>Projections</u>		<u>Source</u>		
1980	State of Hawaii	12,600	84,700	942,300
	OBERS E	N/A**	N/A	886,100
1990	State of Hawaii	N/A	105,100	1,091,500
	OBERS E	N/A	N/A	1,030,500
2000	State of Hawaii	21,900	123,300	1,225,900
	OBERS E	N/A	N/A	1,178,600
2010	OBERS E	N/A	N/A	1,352,700

\*All population projections are rounded to nearest one hundred.

\*\*Not available.

Source: See REFERENCES Nos. 3, 11, 12, 13, and 14.



Approximately 58.5 percent of the County of Hawaii's population resided in rural areas in 1970 (Table 2). This differed little from the 58 percent in rural residency in 1960. One hundred percent of the study area population resided in rural areas.

Table 2  
Population by Urban and Rural Residency

Area	<u>1970 Population</u>			<u>1960 Population</u>		
	Population Per Square Mile	Urban* (%)	Rural* (%)	Population Per Square Mile	Urban* (%)	Rural* (%)
Study Area	7.5	0	100.0	8.0	0	100.0
County of Hawaii	15.7	41.5	58.5	15.2	42.0	58.0
County of Honolulu	1,055.7	93.0	7.0	839.6	86.7	13.3
State of Hawaii	119.6	83.1	16.9	98.1	76.5	23.5

\*Figures represent percent of total population.

Source: See REFERENCES Nos. 2 and 14.

In 1970, the median age of study area residents was considerably higher than that of the state (Table 3). This difference has decreased somewhat as shown by 1974 figures. The study area has a greater percentage of its population in the 45-to-65 and 65-and-over age groups compared to the state as a whole (Fig. A). This in part is due to the net out-migration of younger residents seeking jobs elsewhere. The older residents, on the other hand, have limited mobility and generally desire to live and retire in the study area.

Table 3  
Median Age\*

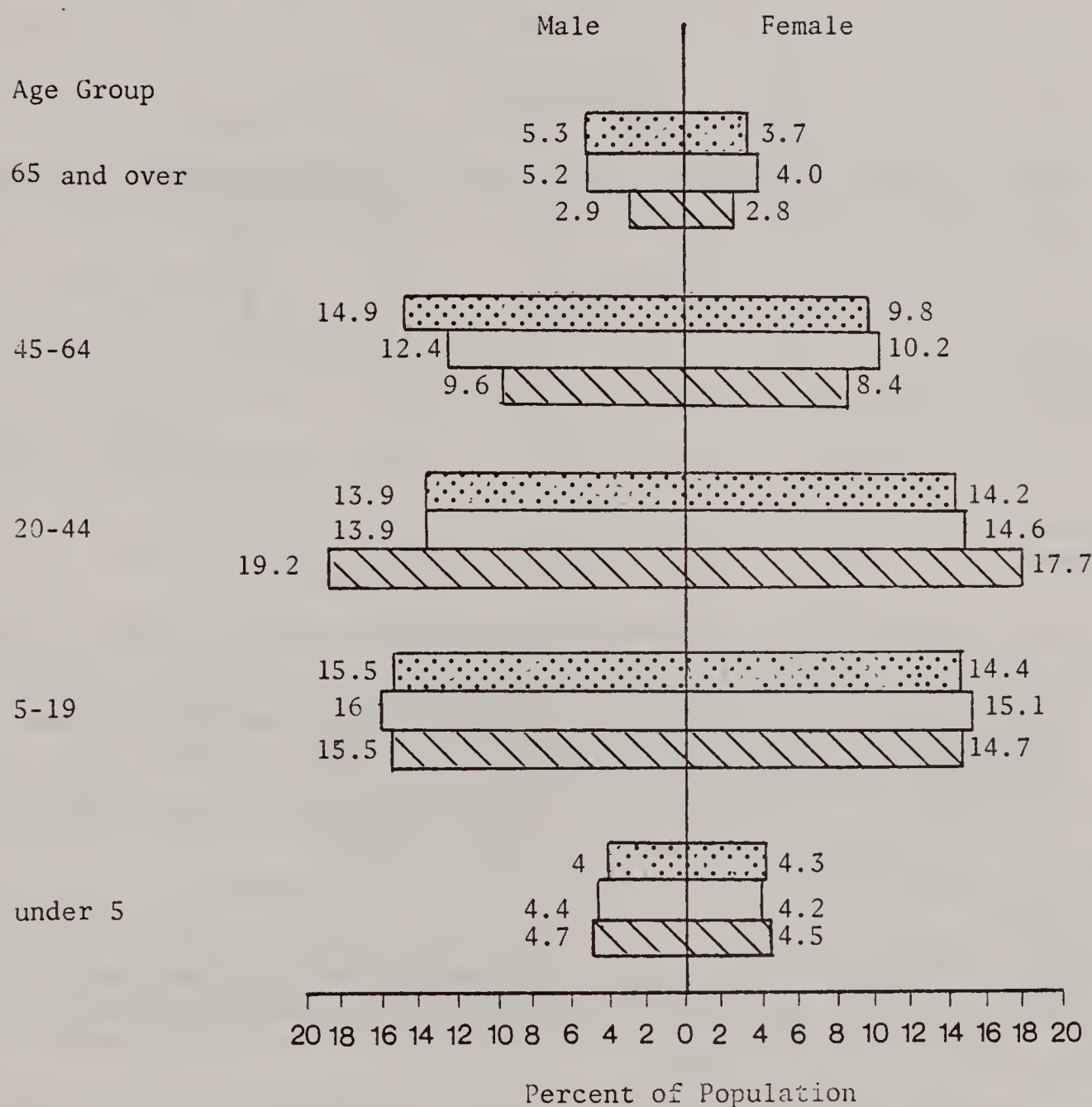
Area	1960	1970	1974
Study Area	27.6	31.0	29.0
County of Hawaii	27.4	28.9	28.0
State of Hawaii	24.3	25.0	27.3

\*In years.

Source: See REFERENCES Nos. 1, 2, 3, 11, and 13.

Figure A

POPULATION BY AGE GROUP  
AND SEX: 1970



	Total Percent	
	Male	Female
Study Area.....	53.6	46.4
Hawaii County.....	51.9	48.1
State.....	51.9	48.1

The study area, like the rest of the state, has no ethnic majority (Table 4). The ethnic distribution of the study area followed the trend of the county and state. Since 1960, there has been a decline in the Japanese and Hawaiian population and an increase in the Caucasian and Filipino population. The ethnic distribution of the study area in 1970 was as follows: Caucasian 33.3%, Japanese 29.6%, Filipino 23.3%, Hawaiian 10.9%, Chinese 1.8%, and other races 1.1%.

Table 4

Ethnic Stock\*

Area	Year	Japanese	Caucasian	Filipino	Chinese	Hawaiian	Other
Study Area	1960**	37.8%	21.2%	22.1%	0.8%	17.7%	0.4%
	1970***	29.6	33.3	23.3	1.8	10.9	1.1
County of Hawaii	1960**	43.9	17.8	15.4	1.7	20.4	0.8
	1970***	37.5	28.8	16.5	2.9	12.3	2.0
State of Hawaii	1960**	32.1	32.0	10.9	6.0	16.2	2.8
	1970***	28.3	39.2	12.4	6.8	9.3	4.0

\*Expressed as percent of total population.

\*\*All 1960 data - old definition - part-Caucasian classified by race of non-Caucasian parent; other persons of mixed race (except part-Hawaiians) classified by race of father.

\*\*\*All 1970 data - new definition - persons of mixed race classified by either self-identification or by race of father.

Source: See REFERENCES Nos. 2, 3 and 11.

In 1970, the median school years completed by study area residents, 25 years or older, was 9.4 years. Although the educational status of area residents has improved, it is comparatively lower than county, state, and U.S. levels (Table 5).

There are four public and two private schools located in the study area with a total 1977-78 school year enrollment of 2,761 students from elementary through high school. Those students in the area desiring a higher education usually attend the University of Hawaii at Hilo or the Hawaii Community College.



Table 5

Years of School Completed: 1970  
(All persons 25 years and over)

Item	Unit	Study Area	County of Hawaii	State of Hawaii	United States
8 years or less	pct.	42.8	37.1	24.8	28.3
High School: 1 to 3 years	pct.	18.4	16.1	13.3	19.3
4 years	pct.	26.3	31.6	35.9	31.1
College: 1 to 3 years	pct.	5.2	7.7	12.0	10.6
4 years or more	pct.	7.3	7.5	14.0	10.7
High School Graduates	pct.	33.6	46.8	61.9	52.4
Median School Years Completed: 1960 yrs.	yrs.	6.7	8.6	11.3	N/A*
1970 yrs.	yrs.	9.4	11.4	12.3	12.1

\*Not available.

Source: See REFERENCES Nos. 2, 3, 10 and 14.

#### Labor Force and Employment

The labor force of the study area was estimated at 3,850 in 1970. This included all residents 16 years and older who were employed or unemployed but seeking employment. The majority of the labor force was between 20 and 64 years of age. Characteristic of Hawaii's labor force is a high proportion of women workers. The 1970 census indicated that 39 percent of all women in the study area, 16 years old and over, were either employed or seeking employment.

In 1970, the unemployment rate for the study area was considerably lower than county, state, and U.S. rates (Table 6). Over the years, unemployment has increased throughout the state, with the County of Hawaii having the highest rates of all the counties. Unemployment in the study area has also increased although it has remained lower than the county and state rates.

In addition to the unemployed, there are workers whose labor is underutilized; thus, their income is less than it might be. The unemployed include those who cannot find work, whereas the underemployed include those who are employed, but at a rate less than they prefer.

Table 6

## Labor Force &amp; Employment Status

Labor Force Items	1970	1971	1972	1973	1974	1975	1976	1977	1978
Study Area:*									
Civilian Labor Force	3,850	4,100	4,100	4,300	4,400	4,600	4,750	4,900	4,700
Employed	3,700	3,800	3,950	4,000	4,150	4,250	4,400	4,500	4,400
Unemployed	100	150	200	250	300	300	450	300	300
Unemployment Rate	2.6%	3.7%	4.9%	5.8%	6.8%	6.5%	9.5%	6.1%	6.4%
County of Hawaii:*									
Civilian Labor Force	28,300	30,200	30,750	32,100	33,150	34,700	35,900	36,600	35,550
Employed	27,050	28,150	28,500	29,500	29,900	31,250	31,850	33,250	31,950
Unemployed	1,250	2,100	2,250	2,600	3,250	3,450	4,100	3,350	3,600
Unemployment Rate	4.4%	6.9%	7.4%	8.2%	9.8%	9.9%	11.4%	9.2%	10.2%
State of Hawaii:*									
Civilian Labor Force	321,550	336,880	351,000	364,600	375,000	383,900	397,000	405,000	398,000
Employed	305,650	313,450	324,050	338,350	345,350	352,050	358,000	375,000	367,000
Unemployed	15,900	23,350	26,950	26,250	29,650	31,850	39,000	30,000	31,000
Unemployment Rate	4.9%	6.9%	7.7%	7.2%	7.9%	8.3%	9.8%	7.4%	7.8%
United States:									
Unemployment Rate	4.9%	5.9%	5.6%	4.9%	5.6%	8.5%	7.7%	7.0%	6.0%

\*Totals may not add due to rounding.

Source: State of Hawaii, Department of Labor and Industrial Relations and see REFERENCES Nos. 3, 8, and 13.

The number of weeks worked during the previous year can be used as a measure of underemployment (Table 7). In 1974, approximately 6.7 percent of the employed study area population, 14 years and over, worked half the year or less. This indicates that, although there is some underemployment in the study area, it is not very serious.

Table 7

Number of Weeks Worked by the Employed: 1974\*

Weeks Worked	Study Area (%)	County of Hawaii (%)
50 - 52	81.3	74.9
40 - 49	9.0	12.8
27 - 39	2.7	3.6
14 - 26	2.0	2.3
13 weeks or less	4.7	4.1
Unknown	0.3	2.3

\*Includes employed population 14 years and over.

Source: See REFERENCES No. 1.

Agricultural-related work remains the primary occupation of study area residents despite the decrease in employment due to the mechanization of the sugar industry (Table 8). There was a big increase in the percentage employed in service occupations, making service-related work one of the major occupations in the study area. Other major occupations are in the operatives and kindred and the craftsmen, foremen and kindred categories.



Table 8

Employment by Occupation - Study Area  
(expressed as percent of total employed)

Occupation	1960 (%)	1970 (%)
Farm Workers, Managers, Laborers, Foremen	31.0	19.2
Operatives & Kindred Workers	22.0	16.6
Craftsmen, Foremen & Kindred Workers	11.7	16.9
Professional, Technical & Kindred Workers	7.1	8.9
Clerical & Kindred Workers	6.3	8.0
Laborers, except Farm & Mine Workers	5.3	5.8
Service Workers except Household	4.8	14.4
Managers, Officials, Proprietors, excluding Farm Workers	4.7	5.0
Private Household Workers	3.0	1.3
Sales	2.0	3.9
Not Reported	2.1	0

Source: See REFERENCES Nos. 2 and 9.

Income and Earnings

Income can be used as a measure of the economic well-being of people. Income data can be used to compare the purchasing power of study area residents to that of other areas.

The median family income for study area residents in 1975 was \$10,284. This was an increase of approximately 22.6 percent since 1969 and 125.1 percent since 1959. Although the income levels of study area residents have increased over the years, they have shown to be consistently lower than county, state, and U.S. levels (Table 9).

In using income statistics as a yardstick of economic well-being, it is important to recognize the magnitude of the cost-of-living difference between Hawaii and other areas of the nation. Significant differentials

exist in the higher cost of living in Hawaii as compared with the continental United States. Study area residents must not only contend with low income levels but also with the high cost of living.

Wages, salaries, proprietor income, and other labor income is referred to as earnings. In 1969, total earnings of the study area residents was approximately \$20 million. Total personal income could not be determined because property income and net transfer payment income figures were not available.

Table 9

Median Family Income & Per Capita Personal Income Levels

	1959	1969	1975
Study Area:			
Median Family Income	\$4,568	\$ 8,389	\$10,284
Per Capita Personal Income	N/A	2,729	N/A
Percent of U.S. Total	N/A	70	N/A
County of Hawaii:			
Median Family Income	\$4,866	\$ 9,750	\$12,028
Per Capita Personal Income	1,903	3,785	5,579
Percent of U.S. Total	86	97	95
State of Hawaii:			
Median Family Income	\$6,366	\$11,554	\$14,611
Per Capita Personal Income	2,368	4,599	6,652
Percent of U.S. Total	107	118	113
United States:			
Median Family Income	\$5,620	\$ 9,867	\$13,719
Per Capita Personal Income	2,212	3,911	5,867

Source: See REFERENCES Nos. 1, 2 and 14.

SELECTED MAJOR INDUSTRIES

Agriculture

Despite its decline in recent years, agriculture remains the major industry in the economy of the County of Hawaii. Agricultural production and processing is of great economic importance to the study area because it provides the greatest source of employment and income for area residents. Approximately 850 families in the study area are directly involved in some type of agricultural production. Hawaii is fortunate in having a year-round growing climate enabling farmers to grow several

crops per year. However, farmers must contend with the high cost of land, water, labor, materials, energy, and transportation.

The major agricultural land uses within the study area are shown in Table 10. The main agricultural commodities of the study area are sugarcane, flower and nursery products, macadamia nuts, vegetable crops, and livestock.

Table 10

Major Agricultural Land Uses Within the Study Area

<u>Land Use</u>	<u>Acres*</u>
Sugarcane - Total	35,720
Irrigated	(6,895)
Pasture	122,620
Truck Crops - Total	560
Irrigated	(560)
Orchard - Total	1,190
Irrigated	(20)
Forest	22,740
Miscellaneous Land	<u>28,830</u>
Total	211,660
Total Irrigated	(7,475)
<u>Percent Irrigated</u>	<u>3.5</u>

\*Figures in ( ) are included in the total for each land use.

Sugar

Sugar dominates the agricultural industry of the state, County of Hawaii, and study area. The production of raw sugar and molasses in the state was valued at \$285.2 million in 1978, up about 26 percent from 1977. The County of Hawaii accounted for \$107 million or about 38 percent of total state returns in 1978. The value of raw sugar production was estimated at \$42.84 million for the study area.



The sugar industry, struggling with depressed prices, rising costs, and increasing urban pressures, has proven to no longer be viable in some areas in the state. Consolidation of companies has become necessary for the survival of the sugar industry. At present, all of the original sugar companies in the study area have consolidated into one company, the Davies-Hamakua Sugar Company. It is now the largest sugar plantation in the state, operating two processing mills, and encompassing approximately 32,000 acres of sugarcane. In addition to Davies-Hamakua, there are about 165 independent sugarcane growers within the study area. They farm a total of about 3,270 acres with farm sizes ranging anywhere from 1 to over 500 acres.

It is a common practice for sugar companies to harvest, transport, and process sugarcane for the independent growers. Growers are paid according to the tons of raw sugar produced minus a percentage for the services performed by the companies. Most sugar grown and processed in the islands is refined in California and marketed under the C&H (California & Hawaii) label.

#### Livestock

The livestock industry in the County of Hawaii has experienced a great increase in market value in 1978. The value of cattle and calves sold increased from \$11.5 million in 1977 to \$16 million in 1978, an increase of almost 40 percent. This increase in value was due mainly to the increase in farm price. Farm price increased 25 percent, from \$31 per hundred weight in 1977 to \$39 in 1978. Whereas, pounds sold increased only 10.9 percent, from 37 million pounds in 1977 to 41 million pounds in 1978.

Pork production decreased from 1.63 million pounds in 1977 to 1.59 million pounds in 1978. This slight decrease does not indicate any trend in decline of future pork production in the county. Production has consistently fluctuated over the past five years from 1.65 million pounds to a low of 1.42 million per year. The value of pork sales has increased from \$888,000 in 1977 to \$968,000 in 1978, an increase of 8.3 percent.

The livestock industry in the study area includes a portion of the Parker Ranch, as well as 150 smaller ranches and two dairies. Approximately 122,620 acres of land in the study area are presently being used for pasture (Table 10).

Parker Ranch, by far the largest ranch in the state, encompasses 226,400 acres; approximately 65,750 acres of which are in the study area. The entire 40,955 head of livestock on the ranch uses water from the study area.

Of the 150 smaller ranches, five ranches range in size from 600 to 12,500 acres, with most of the other ranches averaging less than 100 acres in size. These ranches manage a total of about 11,000 head of livestock.

### Truck Crops

Approximately 560 acres of land in the study area are used for the production of truck crops. This includes areas used for the production of vegetables and melons, and also flower and nursery products. These commodities will continue to increase in value and importance to the economy of the area as new land is brought into production and the demand for these products increases.

There are about 110 truck farms in the study area, located mainly in the Puukapu and Lalamilo farmlots in Waimea. The fertile loamy soils and cool climate of these areas are well suited for the production of crops, such as head lettuce and cabbage, romaine, Chinese cabbage, celery, and broccoli. Root crops, such as burdock, daikon, beets, and carrots are grown in the nonstony areas.

There are a few small truck farms along the Hamakua Coast growing warm climate crops, such as tomatoes and cucumbers. Taro is grown in Waipio Valley, the major taro producing area in the state.

The total vegetable and melon production of the study area had a wholesale value of approximately \$2.7 million in 1979. This represented almost 37 percent of the total value for the County of Hawaii and 14 percent of the state value. Table 11 shows the acreage harvested, production, and value of sales for all vegetables and melons and for the major vegetable crops grown in the study area.

Most of the vegetable crops grown have short-cropping periods, enabling a farmer to plant and harvest several crops a year. Within a farm, the planting area changes throughout the year. A farmer will plant small areas of each crop and rotate them with other vegetable crops. Thus, only a portion of the total area used for growing vegetables may be in crops during any one time.

The state is presently planning to expand the Lalamilo farmlots with an agricultural park of approximately 600 acres, of which 200 acres will be under cultivation. The Department of Hawaiian Homes Land is also expanding their farmlots by 420 acres. Even with these areas in cultivation, statewide production will still fall short of consumption. Figure B shows the total state production and inshipments of fresh vegetables. Hawaii's farmers have been able to produce most of the supply of local-type vegetables, such as Chinese cabbage, burdock, daikon, and taro. However, less than 50 percent of the supply of celery, lettuce, broccoli, carrots, and tomatoes is produced locally. Vegetables in Hawaii are produced in competition with the highly efficient

Table 11

## Vegetable and Melon Crops - Acreage Harvested, Production, and Value of Sales, 1979

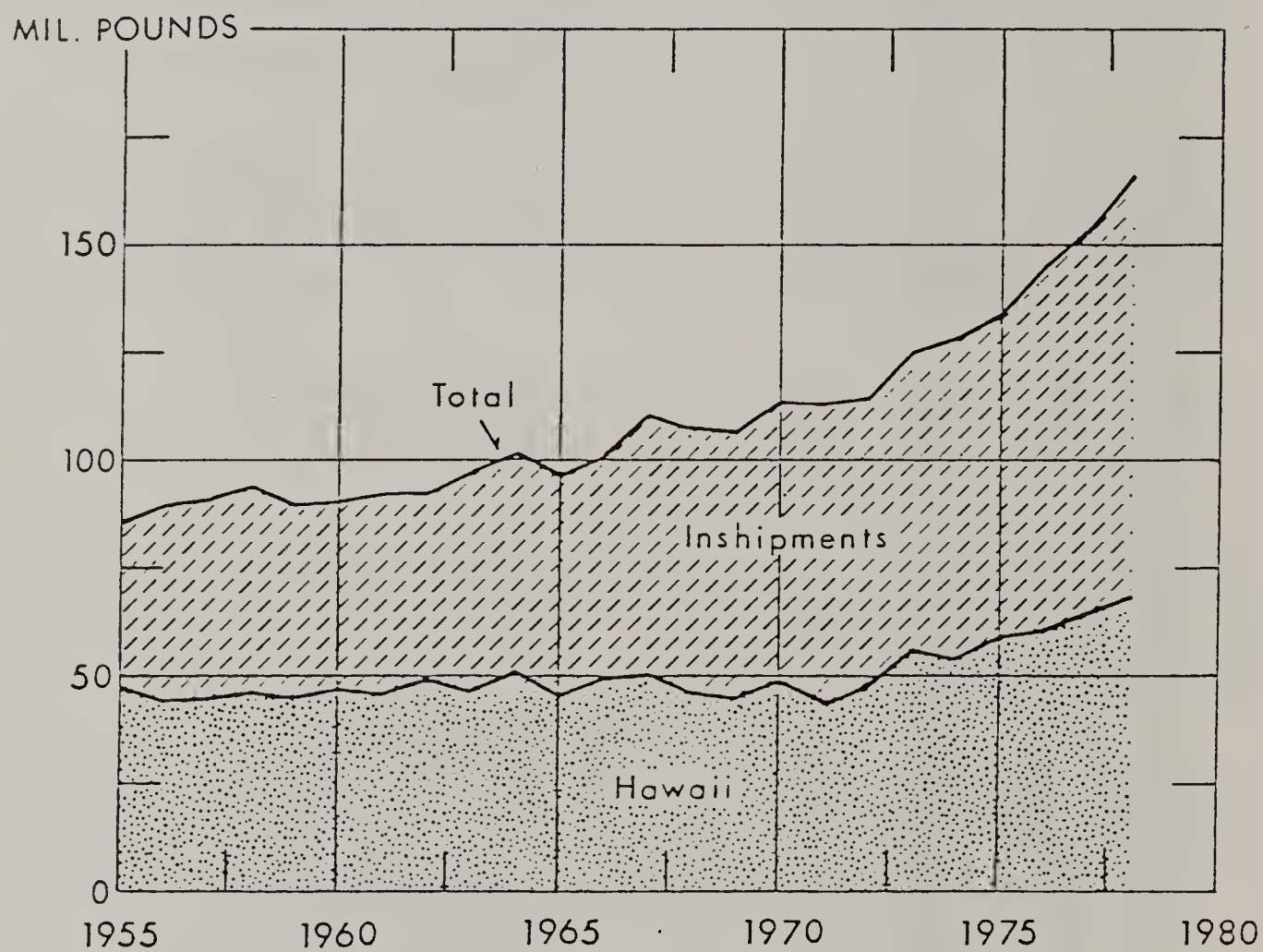
Crop	State of Hawaii			County of Hawaii			Study Area		
	Harvested Production (acres)	Harvested Production (1000 lbs)	Value of Sales (\$1000)	Harvested Production (acres)	Harvested Production (1000 lbs)	Value of Sales (\$1000)	Harvested Production (acres)	Harvested Production (1000 lbs)	Value of Sales (\$1000)
All Vegetables and Melons	4,730	77,260	19,345	1,625	29,425	6,869	700	16,203.1	2,684.1
Major Vege- table Crops Grown in the Study Area:									
Burdock	35	580	287	*	*	*	20	264.0	130.7
Chinese									
Cabbage	335	6,600	1,003	290	5,760	870	172	4,988.0	753.2
Celery	65	2,650	458	50	2,080	347	45	2,475.0	413.3
Daikon	210	3,260	496	110	1,470	138	70	787.5	74.0
Head Cabbage	460	13,600	1,469	*	*	*	72	2,160.0	241.9
Lettuce	650	9,400	1,974	330	4,230	723	200	3,200.0	547.0
Romaine	130	2,270	375	80	1,360	204	44	862.4	129.4
Taro	405	6,750	1,121	70	1,270	250	35	635.0	125.0
Tomatoes	270	6,200	2,065	115	3,765	1,303	13	425.1	147.1

\*Island data not available.  
Source: See REFERENCES No. 4.



Figure B

MARKET SUPPLY: Fresh Market Vegetables,  
State of Hawaii, 1955-78



Source: See REFERENCE No. 5

operations on the West Coast. In view of the rising transportation costs and with improvements in the marketing of local produce, Hawaii's farmers should be able to command more of the market.

Flowers, such as roses, babies breath, protea, and tuberose are also grown in the study area. The few farms that now specialize in the production of these flowers are located in the Waimea and Honokaa areas. In the County of Hawaii, the flower and nursery industry registered a wholesale value of \$8.6 million in 1978. This represented a 26 percent increase over 1977 and 49 percent of the total value for the state. The upward trend in production in recent years is expected to continue as exports increase and markets expand in foreign countries such as Japan, Australia, Italy, and West Germany.

### Orchards

Macadamia nuts are the major orchard crop in the state, with the County of Hawaii commanding 99% of the total production. In 1978, the 459 macadamia nut farms in the county produced 21,930,000 pounds of in-shell nuts with a sales value of \$10.68 million. There are 45 macadamia nut farms in the study area with a total acreage of 1,190 acres. In 1978, the average yield per acre statewide was about 2,400 pounds in-shell, and a farmer could have expected to receive about 48.7 cents per pound for his nuts. The farmers in the study area have indicated that their yields per acre were higher and that they received more per pound than state averages.

### Forest Products

Although there is considerable forested land in the study area (22,740 acres), the only forest resources industry that has thus far been developed is the production of wood chips. The wood chip industry is not very extensive and there is room for the development of other industries. For a more detailed discussion of potential forest resources industries, refer to the Forest Resources Report.



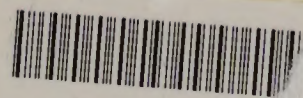


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